FIG. 1

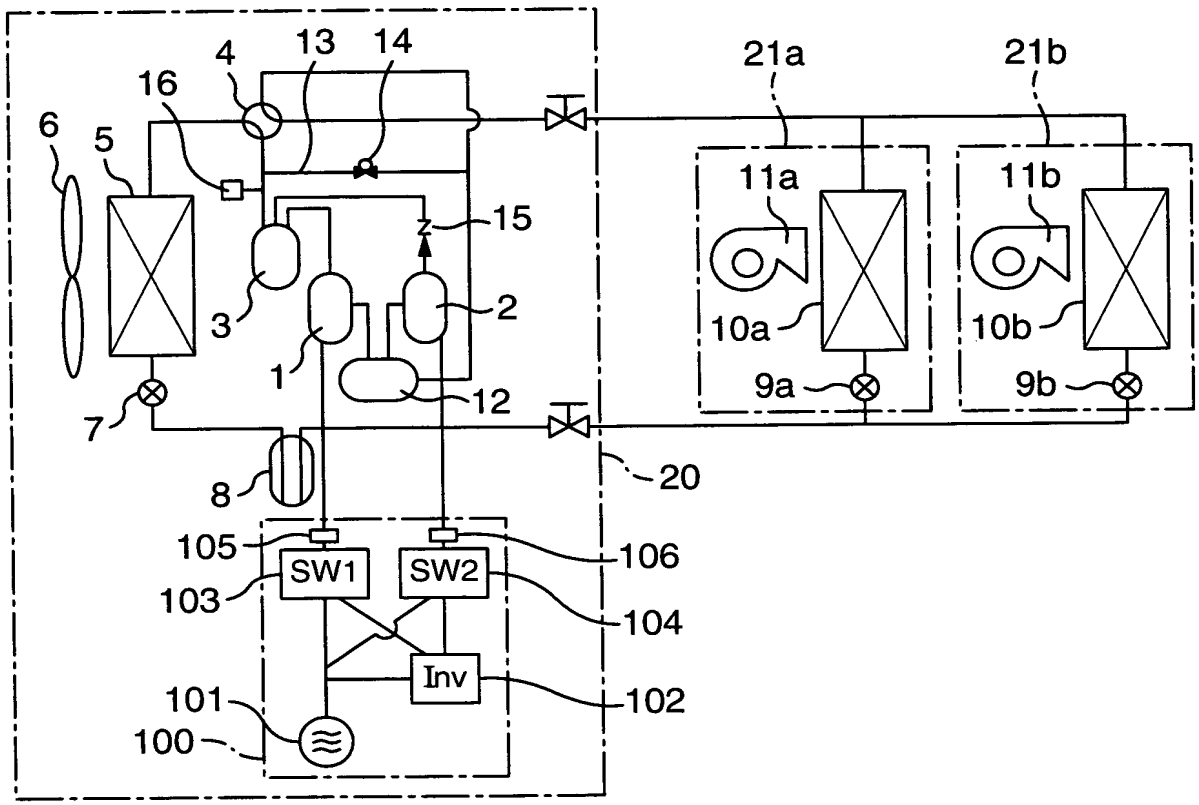

4
13
14
16
6
5
15
3
2
1
12
7
8
20
21a
21b
11a
11b
10a
10b
9a
9b
105
106
SW1
SW2
103
104
Inv
101
102
100

FIG. 2

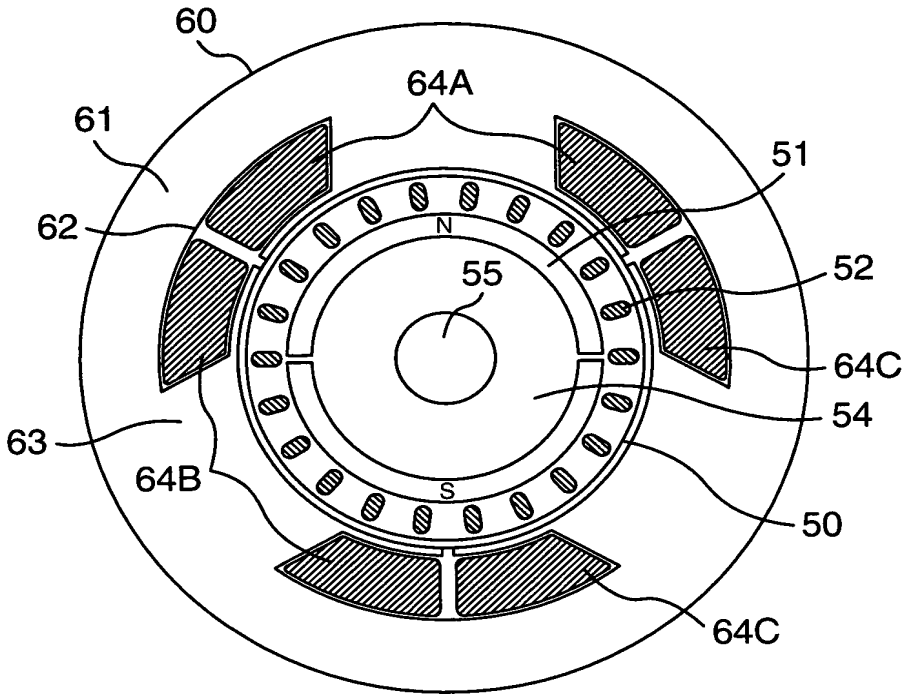


FIG. 3

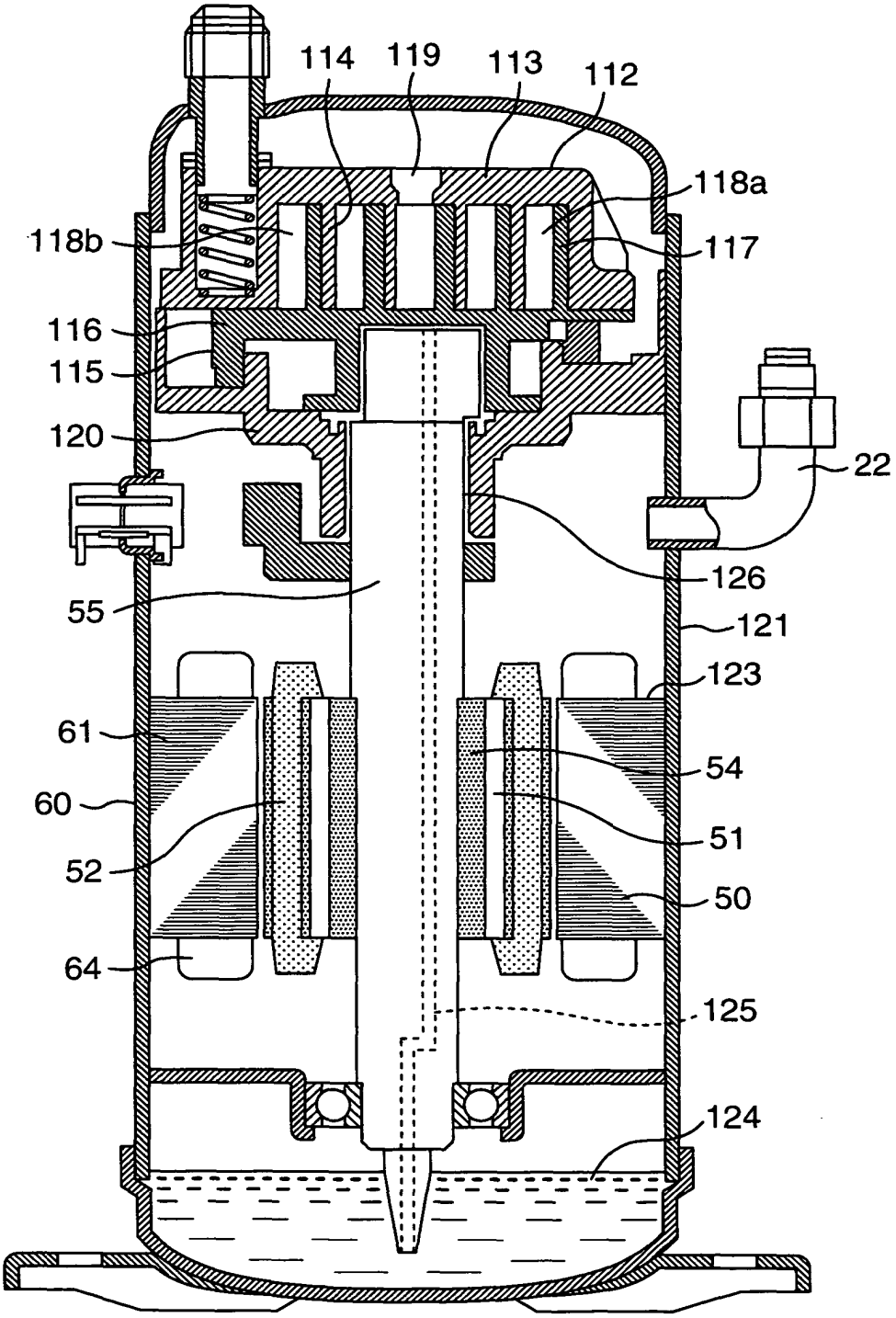

114
119
113
112
118a
118b
117
116
115
120
22
126
55
121
123
61
54
60
51
52
50
64
125
124

FIG. 4

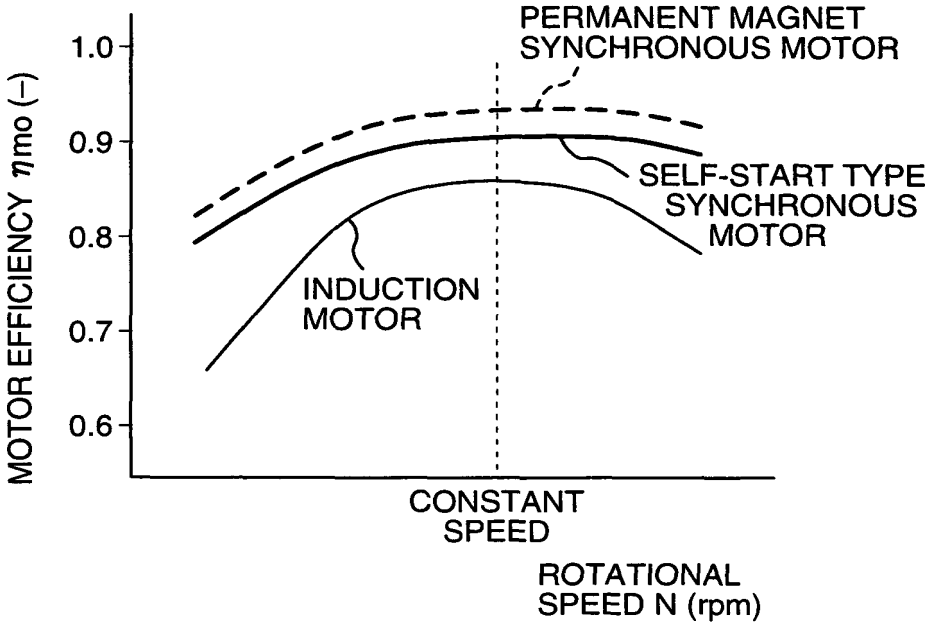

PERMANENT MAGNET SYNCHRONOUS MOTOR
SELF-START TYPE SYNCHRONOUS MOTOR
INDUCTION MOTOR
MOTOR EFFICIENCY ηmo (–)
1.0
0.9
0.8
0.7
0.6
CONSTANT SPEED
ROTATIONAL SPEED N (rpm)

FIG. 5

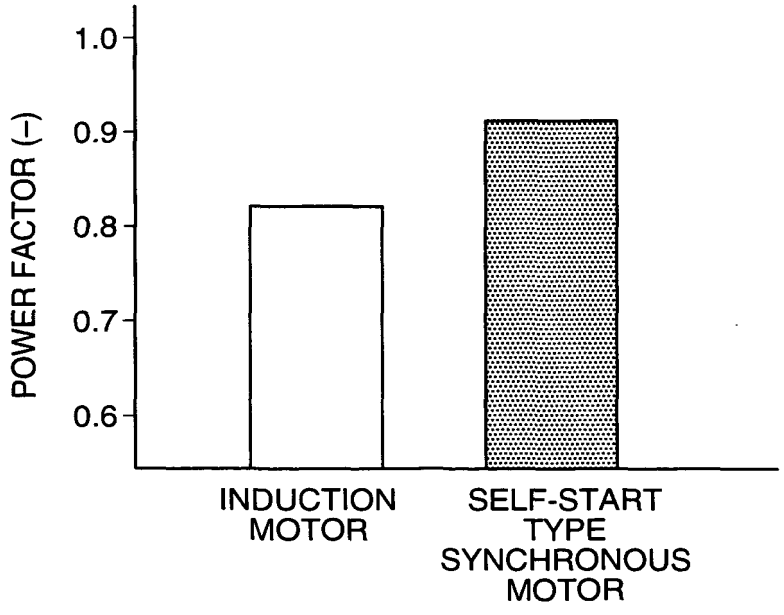

POWER FACTOR (–)
1.0
0.9
0.8
0.7
0.6
INDUCTION MOTOR
SELF-START TYPE SYNCHRONOUS MOTOR

FIG. 6

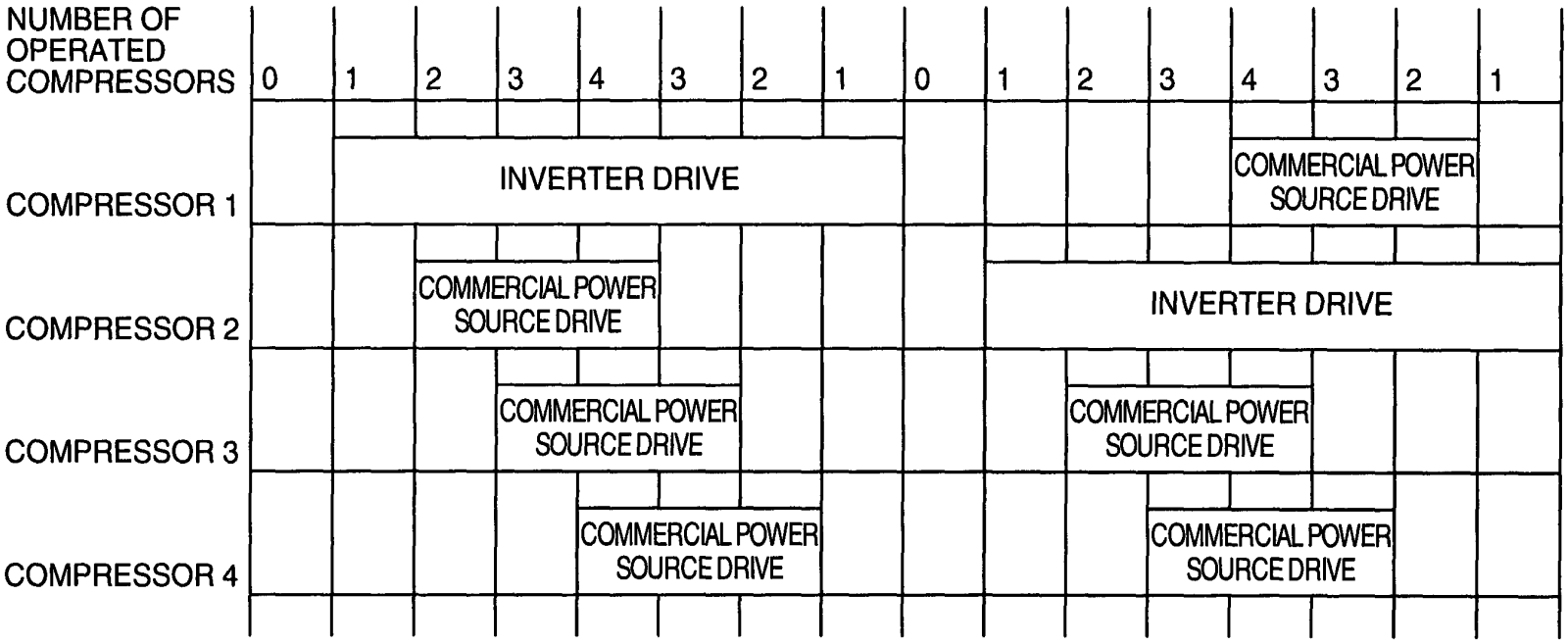

NUMBER OF OPERATED COMPRESSORS
0 1 2 3 4 3 2 1 0 1 2 3 4 3 2 1
COMPRESSOR 1
INVERTER DRIVE
COMMERCIAL POWER SOURCE DRIVE
COMPRESSOR 2
COMMERCIAL POWER SOURCE DRIVE
INVERTER DRIVE
COMPRESSOR 3
COMMERCIAL POWER SOURCE DRIVE
COMMERCIAL POWER SOURCE DRIVE
COMPRESSOR 4
COMMERCIAL POWER SOURCE DRIVE
COMMERCIAL POWER SOURCE DRIVE

FIG. 7

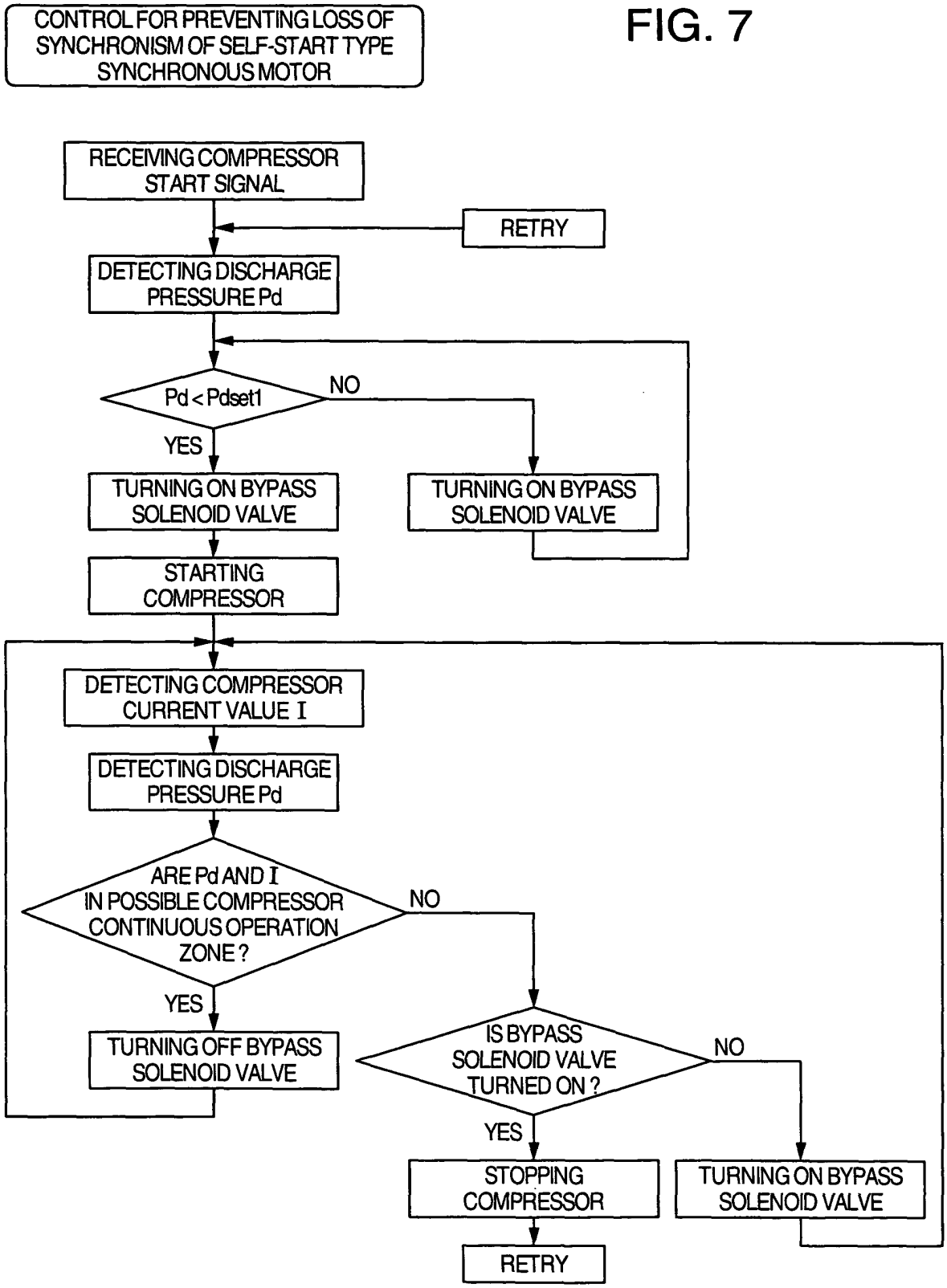

CONTROL FOR PREVENTING LOSS OF SYNCHRONISM OF SELF-START TYPE SYNCHRONOUS MOTOR
RECEIVING COMPRESSOR START SIGNAL
RETRY
DETECTING DISCHARGE PRESSURE Pd
Pd < Pdset1
NO
YES
TURNING ON BYPASS SOLENOID VALVE
TURNING ON BYPASS SOLENOID VALVE
STARTING COMPRESSOR
DETECTING COMPRESSOR CURRENT VALUE I
DETECTING DISCHARGE PRESSURE Pd
ARE Pd AND I IN POSSIBLE COMPRESSOR CONTINUOUS OPERATION ZONE ?
NO
YES
TURNING OFF BYPASS SOLENOID VALVE
IS BYPASS SOLENOID VALVE TURNED ON ?
NO
YES
STOPPING COMPRESSOR
TURNING ON BYPASS SOLENOID VALVE
RETRY

FIG. 8

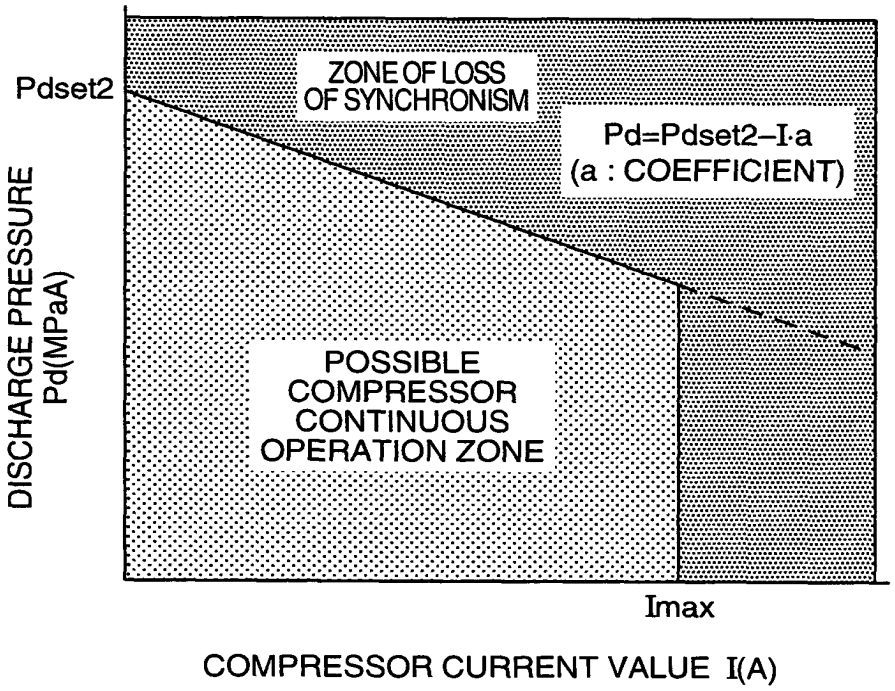
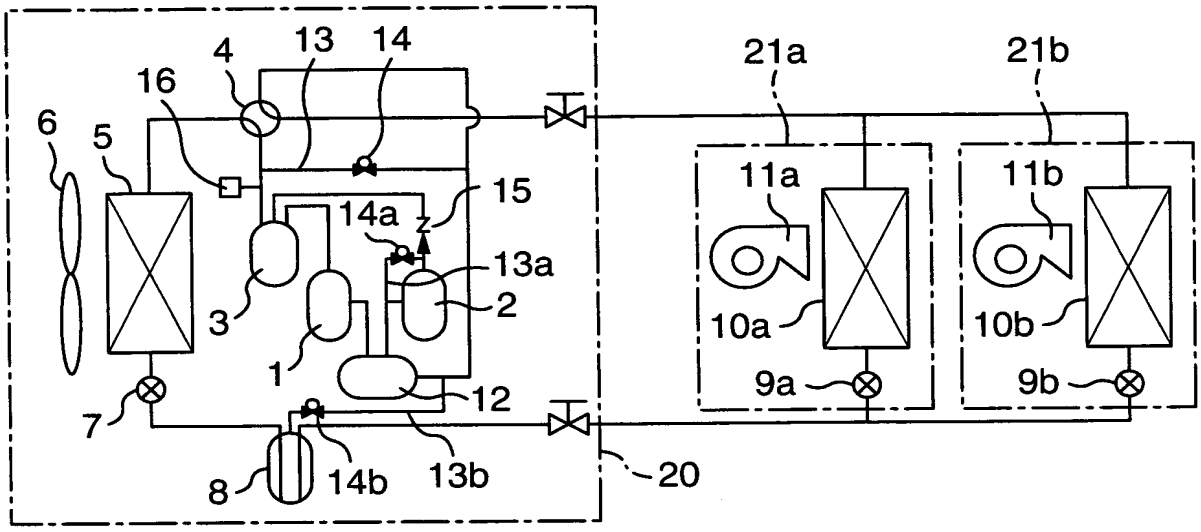

Pdset2
ZONE OF LOSS OF SYNCHRONISM
Pd=Pdset2–I·a
(a : COEFFICIENT)
POSSIBLE COMPRESSOR CONTINUOUS OPERATION ZONE
DISCHARGE PRESSURE Pd(MPaA)
Imax
COMPRESSOR CURRENT VALUE I(A)

FIG. 9


4
13
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14a
13a
2
3
1
12
7
8
14b
13b
20
21a
21b
11a
11b
10a
10b
9a
9b